

tinct narrow line of yellow scales along the inner margin of the forewing, that however is joined to spots 2 and 4 only in 1 ♂; in 2 ♀♀ the edging of spot 2 is enlarged and is only narrowly separated from spot 4 by the dark ground colour. This yellowish line even goes as far as spot 4 in 1 ♂ 1 ♀.

The dark hindwing border often appears in *timeliltica* somewhat less strong than in *youngi*; in the latter it is generally visible as a distinct blue-black peg before the fold which is often less distinct in *timeliltica*.

The underside of the wing is somewhat more matt in *timeliltica* than in *youngi*.

REFERENCES

- Alberti, B. (1958). Über den stammesgeschichtlichen Aufbau der Gattung *Zygaena* F. und ihrer Vorstufen (Insecta, Lepidoptera). *Mitt. zool. Mus. Berl.*, **34**; 1959, *ibidem*, **35**.
- Reiss, H. (1930) In Seitz, *Die Gross-Schmetterlinge der Erde*, Supplement, **2**: 27, pl. 3a.
- (1943). Die *Zygaenen* Marokkos, insbesondere die vom Mittel-Atlas und vom Rifgebirge. *Z. wien. ent. Ges.*, **28**: 362-365, pl. 36, figs. 35-39, pl. 45, figs. IV, V, pl. 46, fig. IX.
- Reiss, H. & Tremewan, W. G. (1960). On the synonymy of some *Zygaena* species, with descriptions of a new species and subspecies from Morocco (Lep., Zygaenidae). *Bull. Brit. Mus. (nat. Hist.) Ent.*, **9**(10): 454-465, pl. 22, fig. 13; pl. 23, figs. 7, 8.
- (1967). A systematic Catalogue of the Genus *Zygaena* Fabricius (Lep., Zygaenidae). *Series ent.*, **2**. Dr. W. Junk, The Hague.
- Rothschild, W. (1925). List of the Lepidoptera collected April to end of June 1925 by E. Hartert and F. Young in Morocco. *Bull. Soc. Sci. nat. Maroc*, **5**: 338.
- Tremewan, W. G. (1961). A Catalogue of the types and other specimens in the British Museum (Natural History) of the Genus *Zygaena* Fabricius (Lep., Zygaenidae). *Bull. Brit. Museum (nat. Hist.) Ent.*, **10**(7): 262, pl. 51, fig. 38, pl. 61, figs. 1, 2.
- Wiegel, K. H. (1965). Beiträge zur Kenntnis einiger Arten der Gattung *Zygaena* Fabr. in Hohen Atlas von Marokko (Lepidoptera, Zygaenidae). *Mitt. münch. ent. Ges.*, **55**: 138, footnote 8.
- Hugo Reiss, 7 Stuttgart 1, Traubenstrasse 15 BI.
Dr. Günther Reiss, 7 Stuttgart-Vaihingen, Barchet 23.

Colony Fission in the House Ant *Monomorium indicum* Forel (Hymenoptera : Formicidae)

By B. L. BRADDOO AND R. K. BRADDOO

Dept. of Zoology, Dayanand Anglovedic College, Abohar (Pb.)
India

ABSTRACT. Some observations on colony fission and nest mates of the house ant *Monomorium indicum* Forel, from Punjab, are given.

Introduction

Colony fission (sociotomy) is one of the methods of founding new colonies among some social insects (Grasse and Noirot 1948, Ribbands 1953, Butler 1955) and social spiders (Bradoo, 1972). In certain species of ants, colony fission has been reported by Elton (1932), Ledoux (1950), Gosswald (1951), Duncan-Weatherly (1953), Schneirla (1956), Vanderplank (1960), Soans and Soans (1971). In this process, a considerable section of the population leaves an old nest and proceeds outwards forming a long column in which all the castes in the society are present. After covering some distance, they finally separate from the old nest and establish a fresh independent colony in a new nest.

Observations

The observations on *Monomorium indicum* Forel. as reported here, were made at 4 p.m. on 19th August 1972, at Abohar, Punjab. It was the second day of the first showers after a long summer and the sky was cloudy. The temperature at the time of observation was 25.5 degrees centigrade and the relative humidity was 86%. Numerous workers of *M. indicum* were emerging from a small opening located in the wall at the base of a cupboard in my room. They moved quickly along the cemented floor and many workers were carrying the whitish immature stages in their mouthparts. Simultaneously, some workers were also returning to the nest. But those coming out were more numerous, in a prominent trail that moved out through a nearest door into the compound. About 40 feet away from the original nest, the trail of workers entered a small crevice at the base of an adjoining house in the compound. While observing the back and forth movement of the workers, two winged ants (reproductives) were found moving slowly at two different places in the trail, surrounded by a large group of workers. At times, the winged ants moved outside the long trail but the surrounding workers forced them back for the onward journey till they finally entered the new nest.

The workers that emerged from the old nest were also accompanied by two types of nest mates, namely, a small black, unidentified Thysanuran and a minute apterous cricket of the genus *Myrmecophila* Latr. Both these nest mates ran very quickly with the workers up to the new nest in the compound. The crickets emerged one at a time from the nest exit after every 3 to 10 minutes. A total of thirty specimens of *Myrmecophila*, in different stages of growth including a few adults were collected by us. When disturbed, they rushed back to the old nest. When killed or disabled they were carried by the workers to the old nest. Schimmer (1909) records in his monograph that *Myrmecophila salomonis* Wasm. lives in the nest of *Monomorium salomonis* (L.) from Tunis.

The second nest mate of *M. indicum* observed during colony fission also emerged as single individuals from the old nest

and these black Thysanurans moved very fast among the workers, dodging every worker that came in front from the opposite side. Many individuals of different sizes of this nest mate were also collected during about one hour duration. When killed or disabled, they received the same treatment as the crickets. Soans and Soans (1971) reported colony fission in a South Indian species, *Monomorium gracillimum* Smith, from Kerala State, but they have found no nest mates in this species.

The movement of the ants between the two nests (old and new) lasted for more than four hours and by 8 p.m., no ants were observed emerging from the old nest. We estimate that during this four hour duration, at least 130 Myrmecophila and about 65 to 70 Thysanurans would have reached the new nest along with a large number of workers. However, all those workers that emerged from the old nest did not necessarily move into the new nest, as some of them returned from mid-way and many others came out of the new nest and moved towards the old nest. But no reproductives or immature stages were returning from the new nest. For most of the time, there was an intermixing of the workers of the two colonies along the trail and by 8 p.m., the number of ants gradually decreased and finally no individuals were found moving between the two colonies which apparently had become well separated and established independently.

Hence, in *M. indicum*, colony fission involves not only the separation of a large number of workers, immature stages and a few winged reproductives but also a considerable number of their nest mates.

Acknowledgements

We wish to thank Dr B. Bolton, British Museum, Natural History, London, for identification of the ant, and Principal N. D. Grover, Dayanand Anglovedic College, Abohar, for the facilities.

References

- Bradoo, B. L. (1972). Some observations on the Ecology of social spider *Stegodyphus sarasinorum* Karsch (Araneae: Eresidae) from India. *Oriental Ins.* 6 (2): 193-204.
- Butler, C. G. (1955). *The World of the honey bee*. MacMillan Co., New York. 226 pp.
- Duncan-Weatherly, A. H. (1953). Some aspects of the biology of the mound ant *Iridomyrmex detectus* Smith. *Australian J. Zool.* 1: 178-192.
- Elton, C. (1932). Territory among wood ants (*Formica rufa* L.) at Picket Hill. *J. Anim. Ecol.* 1: 69-76.
- Gosswald, K. (1951). Über den Lebensablauf von Kolonien der Roten Waldameise. *Zool. Jb.* 80: 27-63.
- Grasse, P. P. and Noirot, C. H. (1948). La sociotomie: migration et fragmentation chez les *Anoplotermes* and *Trinervitermes*. *Behaviour.* 3: 146-166.
- Ledoux, A. (1950). Recherche sur la biologie de la fourmi fileuse *Oecophylla longinoda* (Latr.). *Ann. Sci. nat. Zool.* 11 (12): 313-461

- Ribbands, C. R. (1953). *The behaviour and social life of honey bees*. Bee Research Association Ltd. London. 352 pp.
- Schimmer, F. (1909). Beitrag zu einer Monographie der Gryllodeengattung *Myrmecophila* Latr. *Z. wiss. Zool.* **93**: 409-534.
- Schneirla, T. C. (1956). A preliminary survey of colony division and related processes in two species of army ants. *Insectes soc.* **3**: 49-69.
- Soans, A. B. and Soans, J. S. (1971). Colony fission in the ant, *Monomorium gracillimum* Smith (Hymenoptera: Formicidae). *J. Bombay Nat. Hist. Soc.* **68**: 849-850.
- Vanderplank, F. L. (1960). The bionomics and ecology of the red tree ant, *Oecophylla* sp. and its relationship to coconut bug *Pseudothera pluswayi* (Brown). *J. Anim. Ecol.* **29**: 15-33.

The Robinson Pattern Moth Trap — Trial Modifications

After much experimentation over the last five years, I have modified my basic Robinson pattern moth trap to ensnare those insect losses that occur subsequent to initial capture. The following data were converted from an experimental two feet diameter aluminium dish, to that of a conventional professionally made twelve inch dish—this being the normal trap that is bought. Ideally, sheet aluminium should be used for the following modifications, but doubtless other less expensive materials could be employed.

A smooth interiored cylinder is attached to the inside of the existing insect entry aperture. The dimensions should be such that the diameter is sufficiently large to enable an interior lip of approximately one or two centimetres to be formed by the original aperture edge, and, in length roughly equi-distant to the floor to tube measurement.

The second of the three interdependent additions consists merely of a refinement to the existing water tray. A very shallow cone is formed from a circle of metal, and after a one centimetre hole is drilled through the apex, is attached to the original tray. This component should be of a diameter exceeding the tray by approximately four centimetres.

The final, and most important, refinement is a small cone attached to a stem forming an arrow shape. The cone's diameter is approximately half that of the tube, and the height half that of the cone's diameter. The stem is shaped into a 'battlements' contour, to provide for the release of water when attached to the centre of the new rain trap. Its length should be sufficient to produce a measurement of six centimetres from floor to cone tip.

In conclusion, there are four aids to prevent insect losses once trapped:—

1. The cylinder prevents medium and high flying insects within the trap from finding the exit so easily.